

## CLAIMS

The invention claimed is:

- 5     1.     A shoe upper comprising:
- a lower end of the upper,
- an outer material with a lower end of the outer material,
- 10           a waterproof functional layer, which has a lower end region of the functional layer with a functional layer zone not covered by outer material,
- 15           a connecting band, which extends in the direction of the periphery of the upper, and which has a connecting band upper longitudinal side, joined to the end of the outer material, and a connecting band lower longitudinal side, and which at least partially overlaps the functional layer zone and which consists of liquefiable sealing material or of material through which liquid sealing material can flow,
- 20           wherein at points of curvature of the lower end of the upper the connecting band extends in an arc corresponding to the local radius of curvature, with the two longitudinal sides of the connecting band having different degrees of curvature, in such a way that, for an arc sector lying in the respective curvature, with a predetermined unitary sector angle, the arc lengths of the two longitudinal connecting band sides belonging to this arc sector
- 25           differ from each other the more, the greater the curvature of the respective arc sector is.
- 30     2.     The shoe upper as claimed in claim 1, wherein the lower longitudinal side of the connecting band is joined to the functional layer.
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3. The shoe upper as claimed in claim 1, wherein a region of the connecting band located between the two longitudinal sides of the connecting band is joined to the functional layer.
- 5 4. The shoe upper as claimed in claim 1, with a lining arranged on the inner side of the functional layer.
5. The shoe upper as claimed in claim 4, wherein the functional layer and the lining are equally long in the lower end region of the upper.
- 10 6. The shoe upper as claimed in claim 5, wherein the functional layer and the lining end above the lower longitudinal side of the connecting band.
- 15 7. The shoe upper as claimed in claim 6, wherein the functional layer and the lining end above the lower longitudinal side of the connecting band and are extended by a second connecting band in the direction of the lower end of the upper.
- 20 8. The shoe upper as claimed in claim 7, wherein the second connecting band consists of liquefiable sealing material or of material through which liquid sealing material can flow and wherein at points of curvature of the lower end of the upper the second connecting band extends in an arc corresponding to the local radius of curvature, with the two longitudinal sides of the connecting band having different degrees of curvature, in such a way that, for an arc sector lying in the respective curvature, with a predetermined unitary sector angle, the arc lengths of the two longitudinal connecting band sides belonging to this arc sector differ from each other the more, the greater the curvature of the respective arc sector is.
- 25 9. The shoe upper as claimed in claim 7, wherein a lower longitudinal side of the second connecting band is joined to the lower longitudinal side of the first connecting band.
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10. The shoe upper as claimed in claim 4, wherein the lower end of the lining is longer than the lower end of the functional layer.
- 5 11. The shoe upper as claimed in claim 10, wherein the lower end of the lining is joined to the lower longitudinal side of the first connecting band.
- 10 12. The shoe upper as claimed in claim 10, wherein the functional layer and the lining are parts of a laminate and the lower end of the functional layer is shortened with respect to the lower end of the lining by paring.
- 15 13. The shoe upper as claimed in claim 1, with an insole joined to the lower end of the upper.
- 20 14. The shoe upper as claimed in claim 13, the insole being joined to the lower longitudinal side of the first connecting band.
- 25 15. The shoe upper as claimed in claim 13, the insole being joined to the lower longitudinal side of both the first and the second connecting band.
- 30 16. The shoe upper as claimed in claim 13, the insole being joined to the lower end of the lining.
- 35 17. The shoe upper as claimed in claim 1, wherein, at points of the lower end of the upper with convex curvature, the arc length of the upper longitudinal side of the first connecting band is longer than the arc length of the lower longitudinal side of said connecting band.
18. The shoe upper as claimed in claim 1, wherein, at points of the lower end of the upper with concave curvature, the arc length of the lower longitudinal side of the first connecting band is longer than the arc length of the upper longitudinal side of said connecting band.

19. The shoe upper as claimed in claim 1, wherein, at points of the lower end of the upper with convex curvature, the arc length of the upper longitudinal side of the second connecting band is longer than the arc length of the lower longitudinal side of said connecting band.
20. The shoe upper as claimed in claim 1, wherein, at points of the lower end of the upper with concave curvature, the arc length of the lower longitudinal side of the second connecting band is longer than the upper longitudinal side of said connecting band.
21. The shoe upper as claimed in claim 1, wherein the functional layer zone not covered by outer material is formed by an overhang of the end region of the functional layer with respect to the end of the outer material.
22. The shoe upper as claimed in claim 1, wherein the lower longitudinal side of the first connecting band is joined to a lower edge of the functional layer.
23. The shoe upper as claimed in claim 1, with a substantially rigid connecting band, wherein the differences in arc length, dependent on the respective arc curvature, of the two longitudinal sides of the connecting band are incorporated correspondingly into the band at the production stage.
24. The shoe upper as claimed in claim 23, with a punched connecting band.
25. The shoe upper as claimed in claim 23, with an injection-molded connecting band.
26. The shoe upper as claimed in claim 1, with an elastically extendible connecting band, which is joined on at least one of its longitudinal sides to the associated material while being subjected to longitudinal tensile pre-stress.

27. The shoe upper as claimed in claim 1, with a deformable connecting band, which is joined on at least one of its longitudinal sides to the associated material while being subjected to longitudinal tensile pre-stress leading to plastic deformation.
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28. The shoe upper as claimed in claim 1, wherein the connecting band is joined on its lower longitudinal side to the associated material while being subjected to longitudinal tensile pre-stress.
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29. The shoe upper as claimed in claim 1, wherein the first longitudinal side of the connecting band is sewn to the end of the outer material.
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30. The shoe upper as claimed in claim 1, wherein the lower longitudinal side of the connecting band is sewn to the functional layer.
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31. The shoe upper as claimed in claim 1, wherein the connecting band is non-porous.
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32. The shoe upper as claimed in claim 31, wherein the connecting band is constructed with a sealing material which can be activated by means of activation energy, selected from the forms of energy thermal energy, high-frequency energy, infrared energy and UV energy, into a temporarily liquid state.
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33. The shoe upper as claimed in claim 31 for footwear with a molded-on sole, wherein the connecting band consists of a material which can be melted by hot-liquid sole material during the molding-on of the sole.
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34. The shoe upper as claimed in claim 31, wherein the connecting band is formed by a polyurethane strip.
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35. The shoe upper as claimed in claim 1, wherein the connecting band is porous in such a way that it can be penetrated by liquid sealing material.

- 5 36. The shoe upper as claimed in claim 35, wherein the connecting band is formed by a net band, which has an upper longitudinal web on its upper longitudinal side and a lower longitudinal web on its lower longitudinal side, which webs are joined to each other by means of transverse webs.
- 10 37. The shoe upper as claimed in claim 36, wherein at least the lower longitudinal web is constructed using elastically compliant material.
38. The shoe upper as claimed in claim 36, wherein the transverse webs are constructed using non-elastic material.
- 15 39. The shoe upper as claimed in claim 36, wherein the net band is woven, and wherein longitudinal threads, serving as warp threads, of which at least some are elastic, at least with regard to the upper longitudinal web, are present only in the regions of the longitudinal webs, and the transverse webs are formed by weft threads.
- 20 40. The shoe upper as claimed in claim 1, wherein the lower longitudinal side of the first connecting band is joined to a string-lasting tunnel, wherein a lashing string is arranged, which is longitudinally movable in relation to the string-lasting tunnel and whose lashing together tautens the lower end region of the upper in the inward direction in such a way that the lower end region of the upper with the connecting band extend in the direction of the extent of an outsole still to be applied.
- 25 41. The shoe upper as claimed in claim 40, wherein the lower end of the functional layer or the lower end of the lining or the lower longitudinal side of the second connecting band is joined to a string-lasting tunnel, wherein a lashing string is arranged, which is longitudinally movable in relation to the string-lasting tunnel.
- 30 42. The shoe upper as claimed in claim 41, wherein the lower longitudinal side of the first connecting band and the lower end of the functional layer or the lower end of the lining or the lower



51. The footwear as claimed in claim 46, further comprising an insole, the lower end of the upper and the functional layer zone extend in the direction of the extent of the insole.
- 5 52. The footwear as claimed in claim 51, wherein the insole is joined to the functional layer and the lower longitudinal side of the first connecting band by means of a Strobel seam.
- 10 53. The footwear as claimed in claim 51, wherein the lower end of the upper is lasted by means of lasting cement onto a lower peripheral edge of the insole.
- 15 54. The footwear as claimed in claim 46, further comprising a sheet-like waterproof sealing layer, which is applied to the underside of the lower end of the upper such that it extends parallel to a still to be applied sole in such a way that a lower opening of the upper is sealed as far as the sealing material zone.
- 20 55. The footwear as claimed in claim 54, wherein the sealing layer is formed by a sealing sheet, which is cemented onto the underside of the insole.
- 25 56. The footwear as claimed in claim 55, wherein the sealing sheet has a waterproof functional layer.
- 30 57. A process for producing a shoe upper, which comprises an outer material and a waterproof functional layer, arranged on the inner side of the outer material, with the upper having a lower end, comprising the steps:  
providing an outer material piece cut in the form of the upper;  
  
providing a functional-layer piece cut in the shape of the shoe upper in such a way that a lower end region of the functional-layer piece has a functional layer zone that is not covered by the outer material after the functional-layer piece has been arranged in the correct position on the inner side of the outer material piece;
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joining the lower edge of the outer material piece across its entire periphery to an upper longitudinal side of a connecting band consisting of liquefiable sealing material or of material through which liquid sealing material can flow;

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providing the connecting band, at points of curvature of the lower end of the upper, with an arcuate shape corresponding to the local radius of curvature, with different degrees of curvature of the two longitudinal sides of the connecting band, in such a way that, for an arc sector lying in the respective curvature, with a predetermined unitary sector angle, the arc lengths of the two longitudinal connecting band sides belonging to this arc sector differ from each other the more the greater the curvature of the arc sector is.

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58. The process as claimed in claim 57, wherein the lower longitudinal side of the connecting band is joined to the functional layer.

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59. The process as claimed in claim 57, wherein a region of the connecting band located between the two longitudinal sides of the connecting band is joined to the functional layer.

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60. The process as claimed in claim 57, wherein a lining is arranged on the inner side of the functional layer.

61. The process as claimed in claim 60, wherein the functional layer and the lining are cut to equal lengths at the lower end of the upper.

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62. The process as claimed in claim 61, wherein the functional layer and the lining are made to end above the lower longitudinal side of the connecting band.

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63. The process as claimed in claim 62, wherein the functional layer and the lining are extended by a second connecting band in the direction of the lower end of the upper.

- 5 64. The process as claimed in claim 63, wherein a second connecting band consisting of liquefiable sealing material or of material through which liquid sealing material can flow is used and has at points of curvature of the lower end of the upper an arcuate shape corresponding to the local radius of curvature, with different degrees of curvature of the two longitudinal sides of the connecting band, in such a way that, for an arc sector lying in the respective curvature, with a predetermined unitary sector angle, the arc lengths of the two longitudinal sides of the second connecting band belonging to this arc sector differ from each other the more, the greater the curvature in the arc sector is.
- 10 65. The process as claimed in claim 63, wherein a lower longitudinal side of the second connecting band is joined to the lower longitudinal side of the first connecting band.
- 15 66. The process as claimed in claim 60, wherein the lower end of the lining is made longer than the lower end of the functional layer.
- 20 67. The process as claimed in claim 66, wherein the lower end of the lining is joined to the lower longitudinal side of the first connecting band.
- 25 68. The process as claimed in claim 66, wherein a laminate comprising the functional layer and the lining is used and the lower end of the functional layer is shortened with respect to the lower end of the lining by paring of the functional layer.
- 30 69. The process as claimed in claim 57, wherein the lower end of the upper is joined to an insole.
70. The process as claimed in claim 69, wherein the insole is joined to the lower longitudinal side of the first connecting band.
- 35 71. The process as claimed in claim 69, wherein the insole is joined to the lower longitudinal side of both the first and the second connecting band.

72. The process as claimed in claim 70, wherein the insole is joined to the lower end of the lining.
- 5 73. The process as claimed in claim 57, wherein the arc length of the upper longitudinal side of the connecting band is made longer than the arc length of the lower longitudinal side of the connecting band at points of the lower end of the upper with convex curvature.
- 10 74. The process as claimed in claim 57, wherein the arc length of the lower longitudinal side of the connecting band is made longer than the arc length of the upper longitudinal side of the connecting band at points of the end of the upper with concave curvature.
- 15 75. The process as claimed in claim 57, wherein the functional layer zone is formed by an overhang of the functional layer with respect to the lower edge of the outer material piece.
- 20 76. The process as claimed in claim 57, wherein the connecting band is substantially rigid and wherein the differences in arc length, dependent on the respective arc curvature, of the two longitudinal sides of the connecting band are incorporated by corresponding production.
- 25 77. The process as claimed in claim 76, wherein the connecting band is a punched connecting band.
78. The process as claimed in claim 76, wherein the connecting band is an injection-molded connecting band.
- 30 79. The process as claimed in claim 57, wherein the extendible connecting band is elastically extendible and is joined on at least one of its longitudinal sides to the associated material while being subjected to longitudinal tensile pre-stress.
- 35 80. The process as claimed in claim 57, wherein the connecting band is non-elastically extendible and is joined on at least one of its

longitudinal sides to the associated material while being subjected to longitudinal tensile pre-stress leading to plastic deformation.

- 5      81.      The process as claimed in claim 57, wherein the lower end of the edge of the functional layer is joined to the lower longitudinal side of the extendible connecting band while being subjected to longitudinal tensile pre-stress of the connecting band leading to elastic or non-elastic deformation.
- 10      82.      The process as claimed in claim 57, wherein the connecting band is constructed comprising a sealing material which can be activated by means of activation energy, selected from the forms of energy thermal energy, high-frequency energy, infrared energy and UV energy, into a temporarily liquid state.
- 15      83.      The process as claimed in claim 57, wherein the connecting band comprises a material which can be melted by hot-liquid sole material during the molding-on of the sole.
- 20      84.      The process as claimed in claim 82, wherein the connecting band is formed by a polyurethane strip.
- 25      85.      The process as claimed in claim 57, wherein the connecting band is porous and can be penetrated by liquid sealing material.
- 30      86.      The process as claimed in claim 57, wherein the connecting band is a net band, which has an upper longitudinal web on its upper longitudinal side and a lower longitudinal web on its lower longitudinal side, which webs are joined to each other by means of transverse webs.
- 35      87.      The process as claimed in claim 86, wherein at least the lower longitudinal web is constructed using elastically compliant material.
88.      The process as claimed in claim 86, wherein the transverse webs are constructed using non-elastic material being used.

89. The process as claimed in claim 79, wherein the connecting band has an extendibility of at least 20%.
- 5 90. The process as claimed in claim 57, wherein the lower end of the lining edge and the lower longitudinal side of the connecting band are joined to a string-lasting tunnel, which receives a lashing string which is longitudinally movable in relation to the string-lasting tunnel, and, by lashing together of the lashing string, a lower end region of the upper is tautened in the inward direction in such a way that the lower end region of the upper with the lining edge and the connecting band extend in the direction of the extent of a sole still to be applied.
- 10 91. The process as claimed in claim 57, wherein the functional layer zone is sealed in a waterproof manner by a sealing material in a sealing material zone that extends in the peripheral direction of the end of the upper.
- 15 92. A process for producing footwear, wherein a shoe upper is used which has been produced by the process as claimed in claim 57.
- 20 93. The process as claimed in claim 92, wherein there is molded onto the upper a sole made of sole material which is liquid during the molding-on and, which by penetrating through the porous connecting band, seals in a waterproof manner at least part of the width of the functional layer zone.
- 25 94. The process as claimed in claim 92, wherein the sealing material is in the form of a sealing adhesive which leads to waterproofness in the cured state and, which by penetrating through the porous connecting band, seals in a waterproof manner at least part of the functional layer zone.
- 30 95. The process as claimed in claim 94, wherein the sealing material is in the form of reactive hot-melt adhesive, which leads to waterproofness in the fully reacted state.
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96. The process as claimed in claim 92, wherein a lower end region of the upper is aligned in such a way that it extends in the direction of the extent of an outsole still to be applied, and the lower end region of the upper is joined to an insole.
97. The process as claimed in claim 96, wherein the joining to the insole is achieved by means of a Strobel seam.
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98. The process as claimed in claim 96, wherein the joining to the insole is achieved by means of a lasting operation using lasting cement.
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99. The process as claimed in claim 92, wherein a sheet-like waterproof sealing layer, which seals a lower opening of the upper as far as the sealing material zone, is applied to the underside of the end region of the upper turned back in the direction of the extent of the sole.
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100. The process as claimed in claim 99, wherein a sealing sheet is cemented onto the underside of the insole as the sealing layer.